

PATENT COOPERATION TREATY



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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 03 119 WO		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/DK 03/00795		International filing date (day/month/year) 20.11.2003	Priority date (day/month/year) 20.11.2002
International Patent Classification (IPC) or both national classification and IPC C02F1/32			
Applicant KAAS, Povl			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 3 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 08.06.2004		Date of completion of this report 23.11.2004	
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epimu d Fax: +49 89 2399 - 4465		Authorized Officer Veronesi, S Telephone No. +49 89 2399-8348 	

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/DK 03/00795**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-7 as originally filed

Claims, Numbers

1-17 received on 29.10.2004 with letter of 27.10.2004

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
4. The amendments have resulted in the cancellation of:
- ☐ the description, pages:
 - ☐ the claims, Nos.:
 - ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-17
	No: Claims	
Inventive step (IS)	Yes: Claims	1-17
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The document D1: *US-A-5 348 665 (SCHULTE PETER ET AL) 20 September 1994* describes an apparatus and a method for purifying contaminated water by photochemical oxidation wherein water is directed through a flow channel (cf Fig. 3: 48) wherein the water is irradiated with UV electromagnetic radiation from an array of UV lamps (50) mounted generally parallel with the flow direction in the channel. The lamps are high-pressure lamps (col. 3, l. 40; col. 5, l. 25) with a wave length of 185 nm (col. 3, l. 39).

Present apparatus differs from those of D1 in that the lamp assemblies include a tubular UV absorber around each lamp

Consequently, present claims 1-9 are novel.

2. The problem to be solved is to provide an apparatus ensuring a more reliable radiation. By providing a tubular UV absorber around each lamp the radiation from a lamp does not interfere with radiation from another lamp, thus preventing the change of the wave length to an unpredictable wave length, what occurs in the apparatus of D1 where a lamp radiates light to another lamp or reflects light from another lamp.

The water can thus be treated in the claimed apparatus with a specific predictable wave length.

Moreover, it is likely that the life of the UV lamps can be increased, since the radiation from the other lamps cannot contribute to the deterioration of the lamps.

3. The method of claims 10-17 - interpreted in the meaning of claim 1 (i.e. in the sense that the water is irradiated by an array of UV lamp assemblies, wherein each lamp assembly includes a tubular UV absorber) - also meets the requirements of novelty and inventive step.

AMENDED PATENT CLAIMS:

1. An apparatus for purifying contaminated water by photochemical oxidation, wherein at least a sub-flow of water is directed through a flow channel wherein the water is irradiated with UV electromagnetic radiation from an array of UV lamp assemblies,
5 characterised in that
each of said UV lamp assemblies include a high-pressure UV halogen lamp which is mounted generally parallel with the flow direction in the channel and that
10 the lamp assemblies include a tubular UV absorber around each lamp.
2. An apparatus according to claim 1, wherein the absorber is made of an infrared radiation absorbing material.
- 15 3. An apparatus according to claim 1 or 2, wherein the absorber is made of or coated by a radiation protective material shielding the wave lengths that may decompose or prevent the creation of OH^\bullet and atomic oxygen $\text{O}^{3\text{P}}$.
4. An apparatus according to any of the claims 1 to 3, wherein the lamp assembly
20 includes means for supplying dispersion chemical to the water upstream the UV high-pressure lamp.
5. An apparatus according to claim 4, wherein at least one oxidation chemical is dispersed in the water.
25
6. An apparatus according to claim 5, wherein said oxidation chemical is oxygen, hydrogen peroxide, ozone, perchloric acetic acid or any combination thereof.
7. An apparatus according to any of the claims 1 to 6, wherein the UV high-pressure
30 lamp radiates intensive UV electromagnetic radiation with a wave length in the range

of 150 nm to 260 nm, preferably in the range of 160 nm to 220 nm, and most preferably in the range of 192 nm to 205 nm.

8. An apparatus according to claim 7, wherein the UV high-pressure lamp radiates the water with at least 25 mJ/cm², preferably at least 120 mJ/cm².

9. An apparatus according to any of the preceding claims, wherein an array of lamp assemblies are parallelly arranged in a cassette module, which is insertable into the flow channel.

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10. A method of purifying contaminated water by photochemical oxidation, whereby at least a sub-flow of water is directed through a flow channel wherein the water is irradiated with UV electromagnetic radiation from at least one UV lamp assembly, **characterised in that**

15 the water flow is radiated with UV radiation by at least one UV halogen high-pressure lamp assembly, which is energy intensive wave lengths in the range of 150 nm to 260 nm, preferably in the range of 160 nm to 220 nm, and most preferably in the range of 192 nm to 205 nm and that the at least one lamp assembly includes a tubular UV absorber around the lamp shielding the water flow through the lamp
20 assembly.

11. A method according to claim 10, whereby the absorber is made of an infrared radiation absorbing material.

25 12. A method according to claim 10 or 11, whereby the absorber is made of or coated by a radiation protective material preventing decomposing of OH[•] and preventing the creation of atomic oxygen O^{3P}.

13. A method according to claim 10 to 12, whereby dispersion chemical is supplied into the water flow upstream the UV high-pressure lamp, preferably in the inlet opening of the tubular absorber.
- 5 14. A method according to claim 13, whereby at least one oxidation chemical is dispersed in the water.
15. A method according to claim 14, whereby the oxidation chemical is oxygen, hydrogen peroxide, ozone, perchloric acetic acid or any combination thereof.
- 10 16. A method according to any of the claims 10 to 15, whereby the UV high-pressure lamp radiates the water with at least 25 mJ/cm^2 , preferably at least 120 mJ/cm^2 .
- 15 17. A method according to any of the claims 10 to 16, whereby an array of lamp assemblies are parallelly arranged in the flow channel in a cassette module, which is inserted into the flow channel.